

REMARKS

In view of the following remarks, reconsideration of the objections and rejections contained in the Office Action of May 8, 2009 is respectfully requested.

In the outstanding Office Action, the Examiner objected to the drawings as not showing every feature of the invention as recited in the claims. In particular, the Examiner is apparently taking the position that a boring tool and a vibrator configured as discrete members unattached to each other such that the boring tool jumps and separates from the vibrator when the vibrator applies the ultrasonic vibrations to the boring tool is not shown in any of the drawings. The Applicants respectfully disagree.

Figure 2A of the present application illustrates an ultrasonic horn (vibrator) in contact with the head 2a of a punch (boring tool) 2. The arrow in Figure 2A indicates that force is being applied from the vibrator 1 against the boring tool 2 so that the boring tool 2 jumps and separates from the vibrator 1, as illustrated in Figure 2B. Figures 2C and 2D further illustrate this feature, which is also explained in paragraph [0026] through paragraph [0028] spanning pages 9 and 10 of the original specification. In view of the above explanation, it is evident that the original drawings clearly illustrate all of the features recited in the presently-pending claims. Consequently, the Examiner is respectfully requested to withdraw the objection to the drawings.

The Examiner rejected all of the pending claims in view of the prior art. In particular, the Examiner rejected claims 13-20 and 22-30 (including independent claims 13 and 24) as being unpatentable over the Wada '018 reference (USP 5,413,018) in view of the Ishii reference (JP 9-57696) and the Wada '147 reference (USP 5,205,147); and rejected claim 21 as being unpatentable over the Wada '018 reference in view of the Ishii reference, and further in view of either the Henderson reference (USP 6,305,258) or the Masatoshi reference (JP 61-033795). However, these rejections are respectfully traversed. For the reasons discussed below, it is submitted that the pending claims 13-30 are clearly patentable over the prior art of record.

Independent claims 13 and 24 both require a vibrator and a boring tool which are discrete members unattached to each other *such that the boring tool jumps and separates from the vibrator when the vibrator applies the ultrasonic vibrations to the boring tool*. On page 3 of the

Office Action, the Examiner noted that the Wada '018 reference does not teach that the tool will jump when vibrations are applied via the vibrator. However, the Examiner asserted that the Wada '147 teaches this feature such that one of ordinary skill in the art would have a sufficient reason to modify the Wada '018 reference to obtain the present invention. The Applicants respectfully disagree.

The Wada '147 reference teaches a piezoelectric element 156 within a case 154 and contracts about a center of gravity 158. Although a gap is briefly formed between the workpiece 160 and the piezoelectric element 156 when the piezoelectric element contracts as shown in Figure 22B, the spring 152 forces the workpiece 160 against the piezoelectric element 156 so as to create impact points 162, 164, as shown in Figure 22C. Due to the spring 152 and these contact points 162, 164, the piezoelectric element 156 then remains in contact with the workpiece 160 as shown in Figure 22C, and moves with the movement of the piezoelectric element 156. More specifically, the piezoelectric element 156 and the workpiece 160 remain in contact with each other at contact point 162 during vibration of the piezoelectric element 156. Therefore, the Wada '147 reference does not teach a vibrator and boring tool arranged so that the boring tool *jumps and separates* from the vibrator when the vibrator applies the ultrasonic vibrations to the boring tool (see column 20, lines 5-11 of the Wada '147 reference).

Furthermore, the slight clearance initially formed between the work piece 160 and the piezoelectric element 156 is created when the piezoelectric element 156 *contracts* about the center of gravity 158. However, no vibrations are applied by the piezoelectric element to the workpiece 160 during this contraction. Therefore, the Wada '147 reference also does not teach or suggest a configuration in which the boring tool separates from the vibrator *when the vibrator applies ultrasonic vibrations to the boring tool*.

As explained above, the Wada '147 reference does not correct the deficiencies in the Wada '018 reference. Furthermore, the Ishii reference, the Henderson reference, and the Masatoshi reference also do not correct these deficiencies. Consequently, the combination of prior art as currently applied by the Examiner does not render the claims obvious. Therefore, it is

respectfully submitted that independent claims 13 and 24, and the claims that depend therefrom, are clearly patentable over the prior art of record.

In addition to the above reasons, the Examiner's rejections of several of the dependent claims are also traversed for additional reasons. In item 8 at the top of page 5 of the Office Action, the Examiner has acknowledged that the modified punch of the Wada '018 reference (i.e., the punch as modified by the additional prior art references applied by the Examiner) does not disclose a boring tool that has a spherical surface for contacting the vibrator, as recited in dependent claims 19 and 22. However, the Examiner asserted that this feature is merely an obvious matter of design choice. The Applicants strongly disagree.

The present Inventors have found that utilizing a spherical surface on the boring tool allows the ultrasonic vibrations to be efficiently transferred to the boring tool even if the vibrator is slightly misaligned with the boring tool. Thus, providing a spherical surface is not an example of merely providing a surface that is most expedient, as suggested by the Examiner. Because the Examiner has provided no reasoning for providing a spherical surface as recited in the dependent claims other than improper hindsight, it is submitted that these dependent claims are further clearly patentable over the prior art of record.

In view of the above remarks, it is submitted that the present application is now in condition for allowance. However, if the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact the Applicant's undersigned representative.

Respectfully submitted,

Teruie TAKEMASU et al.

By: 

W. Douglas Hahm
Registration No. 44,142
Attorney for Applicants

WDH/kh
Washington, D.C. 20005-1503
Telephone (202) 721-8200
Facsimile (202) 721-8250
August 10, 2009